

excursions in modern mathematics pdf

excursions in modern mathematics pdf is a valuable resource for students, educators, and mathematics enthusiasts seeking to explore contemporary mathematical concepts in a structured and accessible format. This document typically covers a range of topics that bridge foundational mathematics and advanced theories, making it an ideal tool for enhancing understanding and academic performance. Whether you are preparing for exams or deepening your mathematical knowledge, an excursions in modern mathematics pdf offers comprehensive explanations, illustrative examples, and practice problems. This article delves into the content structure, benefits, and availability of such PDFs, providing insights into how they support learning and teaching. Additionally, it explores key topics commonly found in these resources and offers guidance on maximizing their utility. The following sections outline the core aspects of excursions in modern mathematics pdf materials.

- Overview of Excursions in Modern Mathematics PDF
- Key Topics Covered in Excursions in Modern Mathematics PDF
- Benefits of Using Excursions in Modern Mathematics PDF
- How to Access and Utilize Excursions in Modern Mathematics PDF
- Tips for Effective Study with Excursions in Modern Mathematics PDF

Overview of Excursions in Modern Mathematics PDF

An excursions in modern mathematics pdf is typically a digital version of textbooks or course materials designed to present modern mathematical concepts in an organized and comprehensible manner. These resources are often used in high school and early college courses to introduce students to topics beyond basic arithmetic and algebra. The PDF format allows for easy distribution, study, and reference, enabling learners to access the material anytime and anywhere. Such PDFs focus on practical applications of mathematics, integrating theory with real-world examples to enhance conceptual understanding. Additionally, they may include exercises, summaries, and illustrations that support diverse learning styles.

Purpose and Audience

The primary purpose of an excursions in modern mathematics pdf is to provide

a comprehensive overview of important mathematical ideas that are relevant to contemporary studies and applications. This includes audiences ranging from secondary school students preparing for advanced courses to educators seeking teaching aids. The content is structured to facilitate step-by-step learning, helping users build confidence and competence in topics that are sometimes viewed as challenging.

Format and Features

Modern mathematics PDFs often feature clear formatting with headings, subheadings, and bullet lists to organize content logically. Interactive elements such as practice questions, answers, and diagrams are frequently included to engage the reader. The convenience of a PDF format supports annotation, highlighting, and easy navigation, making it a preferred choice for both self-study and classroom instruction.

Key Topics Covered in Excursions in Modern Mathematics PDF

The content of excursions in modern mathematics pdf materials covers a broad spectrum of mathematical areas, focusing on concepts that are essential for modern scientific and technological applications. These topics extend beyond traditional curricula to include innovative and interdisciplinary mathematical ideas.

Set Theory and Logic

Set theory forms the foundation of modern mathematics, dealing with collections of objects and their relationships. Excursions in modern mathematics PDF typically introduce set operations, Venn diagrams, and basic logic principles such as propositions and truth tables. Understanding these concepts is crucial for reasoning and problem-solving in advanced mathematics.

Number Theory and Cryptography

Number theory explores properties of integers and their applications, including divisibility, prime numbers, and modular arithmetic. Some PDFs also cover introductory cryptography, illustrating how number theory underpins secure communication in the digital age.

Probability and Statistics

Probability theory and statistics are vital for analyzing data and making informed decisions. Excursions in modern mathematics PDFs often include topics such as probability rules, combinatorics, distributions, and statistical measures, providing a practical framework for interpreting real-world phenomena.

Graph Theory and Networks

Graph theory studies relationships modeled as nodes and edges, with applications in computer science, biology, and social networks. These materials introduce basic graph concepts, types of graphs, and algorithms, highlighting the interdisciplinary nature of modern mathematics.

Mathematical Modeling and Applications

Many excursions in modern mathematics PDFs emphasize modeling real-world problems using mathematical tools. This includes linear programming, optimization, and dynamic systems, enabling learners to connect abstract concepts with tangible outcomes.

Benefits of Using Excursions in Modern Mathematics PDF

Utilizing an excursions in modern mathematics pdf offers several advantages for learners and educators. The format and content are designed to enhance engagement, comprehension, and retention of complex mathematical ideas.

Accessibility and Convenience

PDFs can be accessed on multiple devices, facilitating flexible learning schedules. This accessibility ensures that students and teachers can review material anytime without the need for physical textbooks.

Comprehensive and Structured Content

Excursions in modern mathematics PDFs provide a well-organized presentation of topics, often accompanied by examples and exercises. This structure supports incremental learning and helps users master concepts systematically.

Supports Diverse Learning Styles

The inclusion of visual aids, problem sets, and explanatory text caters to different learning preferences. Students can benefit from reading, visualizing, and practicing mathematical concepts within one resource.

Cost-Effective Resource

Many excursions in modern mathematics PDFs are available free or at a lower cost compared to printed textbooks, making them an economical choice for educational institutions and individuals.

How to Access and Utilize Excursions in Modern Mathematics PDF

Acquiring high-quality excursions in modern mathematics pdf files involves identifying reputable sources and selecting materials that align with educational goals. Proper utilization maximizes the learning benefits these documents offer.

Sources for Downloading PDFs

Educational websites, university repositories, and open educational resources often provide free or purchasable excursions in modern mathematics PDFs. It is important to verify the credibility and currency of the material to ensure its relevance and accuracy.

Integrating PDFs into Study Plans

Incorporating excursions in modern mathematics pdf into structured study schedules helps maintain consistent progress. Students should allocate time for reading theoretical sections, solving exercises, and reviewing summaries.

Using PDFs for Teaching and Revision

Educators can use these PDFs as supplementary teaching aids, incorporating exercises and examples into lessons. For revision, PDFs serve as concise references that summarize key concepts and methodologies.

Tips for Effective Study with Excursions in

Modern Mathematics PDF

To maximize the educational impact of excursions in modern mathematics pdf, learners should adopt strategic approaches to studying and engaging with the material.

Active Reading and Note-Taking

Engaging actively with the PDF by highlighting important points, annotating margins, and summarizing sections enhances understanding and retention.

Practice with Exercises

Working through problems included in the PDF reinforces theoretical knowledge and develops problem-solving skills. Consistent practice is essential for mastery.

Seek Supplementary Resources

When encountering difficult topics, students should consult additional textbooks, online tutorials, or study groups to clarify concepts introduced in the PDF.

Regular Review and Self-Assessment

Periodic revision of previously studied sections and self-testing using exercises within the PDF helps consolidate learning and identify areas needing improvement.

1. Download reputable excursions in modern mathematics pdf files from trusted sources.
2. Create a study schedule incorporating reading, practice, and review sessions.
3. Use digital tools to annotate and organize notes within the PDF.
4. Engage with supplementary materials for enhanced comprehension.
5. Evaluate progress regularly to ensure effective learning outcomes.

Frequently Asked Questions

What is the book 'Excursions in Modern Mathematics' about?

'Excursions in Modern Mathematics' is a textbook designed to introduce students to various contemporary mathematical topics beyond traditional calculus and algebra, often covering subjects like graph theory, number theory, logic, and probability.

Where can I find a PDF version of 'Excursions in Modern Mathematics'?

PDF versions of 'Excursions in Modern Mathematics' can sometimes be found through educational resources, university libraries, or authorized ebook platforms. It's recommended to access it through legitimate sources to respect copyright.

Who is the author of 'Excursions in Modern Mathematics'?

The author of 'Excursions in Modern Mathematics' is typically David M. Clark, known for his clear and engaging writing style in mathematical exposition.

Are there any free resources or PDFs related to 'Excursions in Modern Mathematics' available online?

While the full textbook may not be freely available due to copyright, some instructors provide supplementary materials, lecture notes, or sample chapters in PDF format related to the book. Checking university course pages might help.

What are some key topics covered in 'Excursions in Modern Mathematics'?

Key topics often include set theory, logic, number theory, graph theory, probability, statistics, and sometimes voting theory or other applied mathematics areas.

Is 'Excursions in Modern Mathematics' suitable for self-study?

Yes, the book is designed for undergraduates and motivated learners and includes examples and exercises that make it suitable for self-study.

How does 'Excursions in Modern Mathematics' differ from traditional math textbooks?

Unlike traditional textbooks focused on calculus or algebra, this book explores diverse modern mathematical ideas that are often more conceptual and application-oriented.

Can I use 'Excursions in Modern Mathematics' PDF for teaching purposes?

You can use legitimate copies of the PDF for teaching if you have the proper rights or permissions, but distributing unauthorized copies is against copyright laws.

Are there updated editions of 'Excursions in Modern Mathematics' available in PDF format?

Updated editions may be available through official publishers or academic platforms. Purchasing or accessing through libraries ensures you get the latest version in PDF or other digital formats.

Additional Resources

1. *Excursions in Modern Mathematics* by Peter Tannenbaum

This textbook offers a comprehensive introduction to various topics in contemporary mathematics, including graph theory, combinatorics, and number theory. It is designed for students who want to explore interesting mathematical ideas without requiring advanced prerequisites. The book includes numerous real-world applications and exercises to deepen understanding.

2. *Adventures in Modern Mathematics* by Thomas L. Hungerford

Hungerford's book takes readers on a journey through abstract algebra, topology, and other key areas of modern math. It emphasizes conceptual understanding and problem-solving skills, making it suitable for undergraduate students. The text is filled with examples and exercises that encourage exploration and discovery.

3. *Pathways to Modern Mathematics* by David M. Clark

This book introduces foundational topics in modern mathematics such as set theory, logic, and mathematical proof techniques. It is geared toward students transitioning from high school to university-level mathematics. The clear exposition and numerous illustrations help demystify complex concepts.

4. *Explorations in Modern Mathematics* by James Tanton

Tanton's work invites readers to investigate intriguing problems in number theory, geometry, and combinatorics. It is known for its engaging style and emphasis on mathematical thinking rather than rote learning. The book

encourages curiosity and creative problem solving through hands-on activities.

5. *Excursions in Number Theory* by Ogilvy and Anderson

Focusing specifically on number theory, this classic book explores properties of integers, prime numbers, and modular arithmetic. It balances rigorous mathematics with accessible explanations and plenty of puzzles. Readers gain insight into how number theory connects to other fields and everyday applications.

6. *Modern Mathematical Excursions: A Problem-Solving Approach* by R. C. Penner

Penner's text combines theory and practice by presenting modern mathematical concepts alongside challenging problems. Topics include graph theory, probability, and discrete mathematics. The problem-solving approach helps students develop deep analytical skills relevant to both academic and real-world contexts.

7. *Journeys Through Discrete Mathematics* by Gary Haggard, John Schlipf, and Dan Calvert

This book explores discrete mathematics topics such as logic, set theory, and combinatorics with a focus on applications in computer science. It features clear explanations and a variety of exercises aimed at building understanding step-by-step. The text is suitable for undergraduate courses and self-study.

8. *Insights into Modern Mathematics* by Laura Taalman and Jason Rosenhouse

Offering a broad overview of modern mathematical areas, this book covers topics like cryptography, topology, and fractals. It is designed to be accessible to non-mathematicians and those new to higher-level math. The authors use engaging narratives and real-world connections to stimulate interest.

9. *Excursions in Mathematics and Its History* by Helen Grass

This work combines mathematical exploration with historical context, providing readers with a richer understanding of the development of modern mathematics. It covers a wide range of topics, including calculus, algebra, and geometry, along with the stories of key mathematicians. The book appeals to those interested in both the subject matter and its evolution over time.

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Excursions in Modern Mathematics: A Journey Through Key Concepts

Are you struggling to grasp the complexities of modern mathematics? Do textbooks leave you feeling lost and overwhelmed? Are you searching for a clear, concise, and engaging guide that unlocks the beauty and power of advanced mathematical concepts? Then look no further! This ebook provides the perfect entry point to a fascinating world of mathematical exploration, offering accessible explanations and practical examples without sacrificing rigor.

"Excursions in Modern Mathematics" by Dr. Evelyn Reed

Contents:

Introduction: What is Modern Mathematics? Why Study It? Setting the Stage.

Chapter 1: Set Theory and Logic: Foundations of mathematical reasoning. Exploring sets, relations, functions, and logical proofs.

Chapter 2: Number Theory Unveiled: Delving into the properties of numbers, prime numbers, modular arithmetic, and cryptography.

Chapter 3: Abstract Algebra: Groups and Rings: Understanding abstract algebraic structures, their properties, and applications.

Chapter 4: Linear Algebra Essentials: Matrices, vectors, linear transformations, and their applications in various fields.

Chapter 5: Graph Theory and Networks: Exploring graphs, their properties, and applications in computer science and network analysis.

Chapter 6: Introduction to Topology: A gentle introduction to topological spaces, continuity, and fundamental concepts.

Conclusion: Looking Ahead: Further Explorations in Modern Mathematics.

Excursions in Modern Mathematics: A Comprehensive Guide

Introduction: Embarking on a Mathematical Adventure

Modern mathematics, a vast and ever-evolving field, can seem daunting to those unfamiliar with its intricacies. This introductory chapter aims to demystify this perception, highlighting the importance and beauty of modern mathematical concepts while laying the groundwork for our explorations. We'll briefly discuss the historical context of modern mathematics, outlining its departure from classical approaches and emphasizing its interdisciplinary nature. The goal here is to establish a clear understanding of what constitutes "modern mathematics" and to ignite your curiosity about the fascinating topics we'll be exploring. We'll also briefly discuss the structure of the book and what

you can expect to learn from each chapter. Finally, we'll touch upon the essential prerequisites assumed for this book, ensuring you're adequately prepared for the journey ahead.

Chapter 1: Set Theory and Logic: The Building Blocks of Mathematics

This chapter serves as the foundation for the entire book. Set theory, the study of sets (collections of objects), provides the language and framework for much of modern mathematics. We'll explore various set operations (union, intersection, complement) and delve into the concept of functions as mappings between sets. This understanding will be crucial for grasping concepts in subsequent chapters. Furthermore, we'll discuss fundamental logical principles, including propositional logic and predicate logic. Learning to construct logical arguments and proofs is paramount to understanding and appreciating mathematical reasoning. Specific topics will include:

Sets and Subsets: Defining sets, understanding subsets, and exploring Venn diagrams as visual aids.
Set Operations: Mastering the techniques of union, intersection, and difference.

Functions and Relations: Defining functions, exploring their properties (injective, surjective, bijective), and understanding relations as sets of ordered pairs.

Propositional Logic: Truth tables, logical connectives (AND, OR, NOT, implication, equivalence), and tautologies.

Predicate Logic: Quantifiers ($\forall$, $\exists$), predicates, and constructing logical arguments. Examples of simple proofs will be provided.

Chapter 2: Number Theory Unveiled: Exploring the World of Numbers

Number theory, the study of integers and their properties, is a cornerstone of mathematics with profound applications in cryptography and computer science. This chapter will go beyond basic arithmetic, delving into fascinating concepts:

Divisibility and Prime Numbers: Understanding prime factorization, the fundamental theorem of arithmetic, and the infinitude of prime numbers.

Modular Arithmetic: Exploring congruence relations, modular inverses, and their applications in cryptography.

Greatest Common Divisor (GCD) and Least Common Multiple (LCM): Efficient algorithms for computing GCD and LCM, including the Euclidean algorithm.

Diophantine Equations: Solving linear Diophantine equations and introducing the concept of Diophantine equations in general.

Introduction to Cryptography: A brief introduction to RSA cryptography and its reliance on number theory.

Chapter 3: Abstract Algebra: Groups and Rings - Structures and Symmetry

Abstract algebra delves into the study of algebraic structures, moving beyond the familiar number systems to explore more abstract concepts like groups and rings. This chapter will provide a gentle introduction:

Groups: Defining groups, exploring their properties (identity, inverse, associativity), and providing examples of various groups (symmetric groups, cyclic groups).

Subgroups: Understanding subgroups, Lagrange's theorem, and cosets.

Rings: Defining rings, exploring their properties, and providing examples (integers, polynomials).

Fields: Brief introduction to fields as special types of rings.

Isomorphisms and Homomorphisms: Understanding the concept of structure-preserving mappings between algebraic structures.

Chapter 4: Linear Algebra Essentials: Vectors, Matrices, and Transformations

Linear algebra, with its powerful tools of matrices and vectors, is essential in numerous fields. This chapter focuses on fundamental concepts:

Vectors and Vector Spaces: Defining vectors, vector spaces, linear combinations, and linear independence.

Matrices and Matrix Operations: Matrix addition, scalar multiplication, matrix multiplication, and the transpose of a matrix.

Linear Transformations: Understanding linear transformations as mappings between vector spaces.

Eigenvalues and Eigenvectors: Introduction to eigenvalues and eigenvectors and their significance.

Applications in Computer Graphics and Data Science: Briefly illustrating the use of linear algebra in these fields.

Chapter 5: Graph Theory and Networks: Connecting the Dots

Graph theory studies graphs, mathematical structures consisting of vertices and edges. This chapter covers:

Basic Definitions: Defining graphs, directed and undirected graphs, trees, and paths.

Graph Traversal Algorithms: Exploring breadth-first search (BFS) and depth-first search (DFS).

Connectivity and Paths: Understanding connected components and shortest paths.
Eulerian and Hamiltonian Circuits: Exploring the existence of Eulerian and Hamiltonian cycles.
Applications in Networks and Social Networks: Illustrating the use of graph theory in network analysis and social network analysis.

Chapter 6: Introduction to Topology: Exploring Shapes and Spaces

Topology, the study of shapes and spaces that are invariant under continuous deformations, provides a different perspective on geometry. This chapter offers a gentle introduction:

Topological Spaces: Defining topological spaces and their properties.
Continuous Functions: Understanding continuous mappings between topological spaces.
Connectedness: Exploring the concept of connectedness in topological spaces.
Compactness: A brief introduction to compactness.
Homeomorphisms: Understanding homeomorphisms as structure-preserving mappings between topological spaces.

Conclusion: A Glimpse into the Future

This ebook provides a stepping stone into the exciting world of modern mathematics. It's intended to stimulate your curiosity and encourage further exploration. The conclusion summarizes the key concepts covered, highlights the interconnectedness of the various branches of modern mathematics, and suggests further reading resources for deeper dives into each topic. It also provides a roadmap for continued learning and development in this vast and ever-expanding field.

FAQs

1. What is the prerequisite knowledge needed for this ebook? A solid foundation in high school algebra and some familiarity with basic mathematical notation is recommended.
2. Is this ebook suitable for beginners? Yes, it's designed to be accessible to beginners with a basic mathematical background.
3. Does the ebook include exercises and solutions? While not explicitly including exercises, the text incorporates many examples and illustrations to reinforce understanding.

4. What software or tools are needed to read this ebook? You can read this ebook using any PDF reader.
5. How long does it take to read and understand this ebook? The reading time varies depending on individual pace and background, but a dedicated reader can expect to complete it within several weeks.
6. What are the key applications of modern mathematics? Modern mathematics finds applications in numerous fields, including computer science, cryptography, data science, physics, engineering, and finance.
7. Are there any specific chapters that are more challenging than others? Chapters 3 (Abstract Algebra) and 6 (Topology) may present a steeper learning curve for some beginners.
8. Is there a way to get support if I have questions? While there isn't dedicated support, many resources are available online to help clarify concepts.
9. What makes this ebook different from other mathematics textbooks? This ebook is designed for accessibility and engagement, focusing on clear explanations and practical examples to make complex concepts understandable.

Related Articles:

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2. Understanding Prime Numbers and their Applications: This article focuses on prime numbers, their properties, and their significance in cryptography.
3. Modular Arithmetic Explained: This article explains the basics of modular arithmetic, including congruence relations and applications.
4. Groups: An Intuitive Approach: This article provides an intuitive understanding of groups and their properties, suitable for those new to abstract algebra.
5. Linear Algebra for Beginners: This article presents a basic introduction to vectors, matrices, and linear transformations.
6. Graph Theory and its Applications in Networks: This article explores the use of graph theory in analyzing networks and social networks.
7. An Introduction to Topology: The Basics: This article provides a friendly and accessible introduction to the core concepts of topology.
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9. The Role of Mathematics in Modern Technology: This article highlights the significant role mathematics plays in various technologies we use daily.

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excursions in modern mathematics pdf: *An Invitation to Abstract Mathematics* Béla Bajnok, 2020-10-27 This undergraduate textbook promotes an active transition to higher mathematics. Problem solving is the heart and soul of this book: each problem is carefully chosen to demonstrate, elucidate, or extend a concept. More than 300 exercises engage the reader in extensive arguments and creative approaches, while exploring connections between fundamental mathematical topics. Divided into four parts, this book begins with a playful exploration of the building blocks of mathematics, such as definitions, axioms, and proofs. A study of the fundamental concepts of logic, sets, and functions follows, before focus turns to methods of proof. Having covered the core of a transition course, the author goes on to present a selection of advanced topics that offer opportunities for extension or further study. Throughout, appendices touch on historical perspectives, current trends, and open questions, showing mathematics as a vibrant and dynamic human enterprise. This second edition has been reorganized to better reflect the layout and curriculum of standard transition courses. It also features recent developments and improved appendices. *An Invitation to Abstract Mathematics* is ideal for those seeking a challenging and engaging transition to advanced mathematics, and will appeal to both undergraduates majoring in mathematics, as well as non-math majors interested in exploring higher-level concepts. From reviews of the first edition: Bajnok's new book truly invites students to enjoy the beauty, power, and challenge of abstract mathematics. ... The book can be used as a text for traditional transition or structure courses ... but since Bajnok invites all students, not just mathematics majors, to enjoy the subject, he assumes very little background knowledge. Jill Dietz, MAA Reviews The style of writing is careful, but joyously enthusiastic.... The author's clear attitude is that mathematics consists of problem solving, and that writing a proof falls into this category. Students of mathematics are, therefore, engaged in problem solving, and should be given problems to solve, rather than problems to imitate. The author attributes this approach to his Hungarian background ... and encourages students to embrace the challenge in the same way an athlete engages in vigorous practice. John Perry, zbMATH

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the ideas and motivations leading to key models, notions, and results. In particular, he looks at algorithms and complexity, computations and proofs, randomness and interaction, quantum and arithmetic computation, and cryptography and learning, all as parts of a cohesive whole with numerous cross-influences. Wigderson illustrates the immense breadth of the field, its beauty and richness, and its diverse and growing interactions with other areas of mathematics. He ends with a comprehensive look at the theory of computation, its methodology and aspirations, and the unique and fundamental ways in which it has shaped and will further shape science, technology, and society. For further reading, an extensive bibliography is provided for all topics covered.

Mathematics and Computation is useful for undergraduate and graduate students in mathematics, computer science, and related fields, as well as researchers and teachers in these fields. Many parts require little background, and serve as an invitation to newcomers seeking an introduction to the theory of computation. Comprehensive coverage of computational complexity theory, and beyond High-level, intuitive exposition, which brings conceptual clarity to this central and dynamic scientific discipline Historical accounts of the evolution and motivations of central concepts and models A broad view of the theory of computation's influence on science, technology, and society Extensive bibliography

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and physical perspectives with the aim of furthering interaction between the two fields. The material will be particularly useful for mathematicians and physicists who wish to advance their understanding across both disciplines. Mirror symmetry is a phenomenon arising in string theory in which two very different manifolds give rise to equivalent physics. Such a correspondence has significant mathematical consequences, the most familiar of which involves the enumeration of holomorphic curves inside complex manifolds by solving differential equations obtained from a "mirror" geometry. The inclusion of D-brane states in the equivalence has led to further conjectures involving calibrated submanifolds of the mirror pairs and new (conjectural) invariants of complex manifolds: the Gopakumar-Vafa invariants. This book gives a single, cohesive treatment of mirror symmetry. Parts 1 and 2 develop the necessary mathematical and physical background from "scratch". The treatment is focused, developing only the material most necessary for the task. In Parts 3 and 4 the physical and mathematical proofs of mirror symmetry are given. From the physics side, this means demonstrating that two different physical theories give isomorphic physics. Each physical theory can be described geometrically, and thus mirror symmetry gives rise to a "pairing" of geometries. The proof involves applying R -circle duality to the phases of the fields in the gauged linear sigma model. The mathematics proof develops Gromov-Witten theory in the algebraic setting, beginning with the moduli spaces of curves and maps, and uses localization techniques to show that certain hypergeometric functions encode the Gromov-Witten invariants in genus zero, as is predicted by mirror symmetry. Part 5 is devoted to advanced topics. This one-of-a-kind book is suitable for graduate students and research mathematicians interested in mathematics and mathematical and theoretical physics.

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